SPACE NETWORK
PRODUCT COMMITMENT DOCUMENT

Tracking and Data Relay Satellite System
K-Band Single Access Return Upgrade Project

Effective Date: April 20, 2005

It is the responsibility of each of the signing parties to notify the other in the event that a commitment cannot be met, and to initiate a timely renegotiation of the terms of this agreement.

AGREEMENTS: **DATES**

Caren Gioannini — 4/27/05

Caren C. Gioannini
TKUP Product Manager/Product Design Lead
Space Network Project, Code 565/452

Keiji K. Tasaki — 4/21/05

Keiji K. Tasaki
Project Manager
Space Network Project, Code 452

1.0 PRODUCT OBJECTIVES

The National Aeronautics and Space Administration (NASA's) Space Network (SN) consists of a constellation of nine Tracking and Data Relay Satellites (TDRS) and ground terminals at White Sands, New Mexico and Guam, Mariana Islands. The ground terminals were designed and implemented in the early 1990s, and some of the systems (including the K-band Single Access Return (KSAR) high rate equipment and the high-rate switches) are reaching obsolescence. Additionally, SN Customers are looking forward to higher data rate communications exceeding the 300 Mbps maximum currently available via the SN's 225 MHz return channels. Many Customers, including the International Space Station [ISS] Japan Aerospace Exploration Agency [JAXA]/Japanese Experiment Module [JEM], have indicated a non-stacked coding/decoding scheme is preferable with today's technology.

The new TDRSS KSAR Upgrade Project (TKUP) to be established by this Product Commitment Document (PCD) will enhance the TDRSS KSAR (both Ku and Ka) 225 MHz data service by adding the capability to process bandwidth-efficient signal designs, including OQPSK/Turbo Product Code (TPC) or Low Density Parity Check (LDPC) code and 8PSK/TPC or LDPC. It will provide single-access antenna autotrack capability for the new signal designs. Also, the KSAR service will be enhanced by adding the capability to process signals without stacking of convolutional encoder/decoders. The TKUP will also replace the White Sands Complex (WSC) and Guam Remote Station (GRS) KSAR high-rate equipment and high-rate switches nearing obsolescence.

The enhanced 225 MHz KSAR data service provided by TKUP will enable SN Customers to achieve data rates in excess of the current SN 300 Mbps maximum to at least 625 Mbps by using bandwidth-efficient coding and modulation. The new signal designs will also enable SN Customers to realize significant reductions in required Effective Isotropic Radiated Power (EIRP) compared with existing services operating at rates between 150 Mbps and 300 Mbps by adding support of coded signals in this data rate range. The TKUP has potential to improve the legacy autotrack services and to provide one-way and/or two-way Doppler tracking for the new signal designs. SN compatibility with JEM would enable the use of this new Ka-band service as backup for the ISS Ku-band antenna without implementing a KSAR Intermediate Frequency (IF) service, which would require installing customer unique equipment at WSC.

2.0 PROJECT AUTHORITY

The SN Project (Code 452) is authorizing and funding the TKUP. The SN Project Manager (PM) reports to GSFC's Space Communications Program (SCP), Code 450, and to the NASA Headquarter's Office of Space Operations' Space Communications and Data Services (SCDS) Program Executive.

The TKUP PM/Product Design Lead (PDL) reports to the SN PM. The TKUP PM/PDL will use various Code 450 contract mechanisms, e.g., Near Earth Network Services (NENS) contract Indefinite Delivery, Indefinite Quantity (IDIQ) Task Order, Systems

Engineering Support contract Task Order, Electrical Systems Engineering Services (ESES) Task Order, in addition to tasking GSFC's Advanced Engineering and Technology Directorate (AETD), Code 500, to accomplish the objectives of this PCD.

3.0 SCHEDULE COMMITMENTS

PROJECT SCHEDULE COMMITMENT

Deliverable	*FY05*	*FY06*	*FY08*
System Requirements Review	04/05		
Preliminary System Design Review	09/05		
Demonstration Complete		08/06	
Critical System Design Review		10/06	
Implementation Complete			08/08
Integration and Testing Complete			08/08
Documentation and Training Complete			08/08
Operations Readiness Review			08/08
Transition to O&M/Sustaining			08/08

4.0 RESOURCE COMMITMENTS

Contact the TKUP PM/PDL for resource commitments.

5.0 PROJECTED RECURRING COSTS

Additions to existing SN operations, maintenance, and sustaining engineering costs due to the TKUP are anticipated to be minimal. The TKUP will be integrating hardware, software, and firmware into larger systems, which have budgets for recurring costs. The changes in these costs due to the TKUP are anticipated to be insignificant.

6.0 RISK MANAGEMENT

Risk management will be an on-going activity for the TKUP. Risks will be discussed in bi-weekly project meetings and will be tracked by the TKUP PM/PDL. The TKUP PM/PDL will report risks to the SN PM via the Monthly Status Review (MSR) process.

7.0 EXTERNAL AND INTERNAL AGREEMENTS/DEPENDENCIES

The Johnson Space Center (JSC) Electronic Systems Test Laboratory (ESTL) may wish to obtain duplicate hardware (TKUP receivers, test modulators, autotrack systems, etc.) in order to establish the new KSAR data service test capability. Funding would be applied separately from JSC for this effort.

No future SN customers have identified the new KSAR data service as a requirement.

8.0 PERFORMANCE MEASUREMENT REQUIREMENTS

The TKUP PM/PDL will conduct bi-weekly meetings with the TKUP team and will conduct MSRs with the NENS and Systems Engineering Support contractor teams. The MSRs will discuss technical, cost, schedule, and risk aspects of the project. The TKUP PM/PDL will provide MSR inputs to the SN PM.

CHANGE HISTORY LOG

Revision	Effective Date	Description of Changes
Baseline CCR 452/173	XX/XX/XXXX	Initial Release